

## The Role of Engineering Management Information Systems in Enhancing the Quality of Managerial Decision-Making: An Analytical Study of Engineering Design Group

Tarek Mohamed Alhadi Elkabier Baayou<sup>1\*</sup>, Abdullah Ali Elmeddhem<sup>2</sup>, Mdhat Ismail Almabrouk<sup>3</sup>

<sup>1</sup> Department of Biomedical Engineering, Faculty of Medical Technology, Misrata, Libya

<sup>2,3</sup> General Department, College of Civil Aviation, Misrata, Libya

\*Corresponding author: [tarekbaayou@gmail.com](mailto:tarekbaayou@gmail.com)

Received: 11-10-2025	Accepted: 25-12-2025	Published: 12-01-2026
	Copyright: © 2026 by the authors. This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license ( <a href="https://creativecommons.org/licenses/by/4.0/">https://creativecommons.org/licenses/by/4.0/</a> ).	

### Abstract:

This study aims to examine the role of engineering management information systems in enhancing the quality of managerial decision-making within Engineering Design Group. In today's dynamic and complex engineering environments, organizations increasingly rely on management information systems to support effective planning, control, and decision-making processes. Engineering organizations, in particular, require accurate, timely, and integrated information to manage technical complexity and organizational resources efficiently.

The study adopts a quantitative analytical approach to investigate the impact of engineering management information systems on the quality of managerial decision-making. Data were collected through a structured questionnaire distributed to a sample of employees and managers at Engineering Design Group. Descriptive statistical methods and inferential analyses were employed using the Statistical Package for the Social Sciences (SPSS) to analyze the collected data and test the study hypotheses.

The findings indicate that engineering management information systems play a significant role in improving the quality of managerial decision-making by enhancing information accuracy, availability, timeliness, and integration. The results also reveal that effective use of management information systems supports rational decision-making, reduces uncertainty, and improves managerial efficiency. The study concludes that investing in advanced engineering management information systems contributes positively to organizational performance and decision quality.

Based on the findings, the study recommends strengthening the adoption of integrated management information systems, providing continuous training for users, and aligning information systems with organizational decision-making needs to enhance managerial effectiveness within engineering organizations.

**Keywords:** Engineering Management Information Systems, Decision-Making Quality, Managerial Decisions, Management Information Systems, Managerial Efficiency, Engineering Organizations.

## دور نظم المعلومات الإدارية الهندسية في تحسين جودة اتخاذ القرارات الإدارية: دراسة تحليلية لمجموعة التصميم الهندسي

طارق محمد الهادي الكبير بعيو<sup>1\*</sup>، عبدالله علي المذهم<sup>2</sup>، مدحت إسماعيل المبروك<sup>3</sup>

<sup>1</sup> قسم هندسة المعدات الطبية، كلية التقنية الطبية، مصراتة، ليبيا

<sup>2,3</sup> القسم العام، كلية الطيران المدني، مصراتة، ليبيا

الملخص

تهدف هذه الدراسة إلى التعرف على دور نظم المعلومات الإدارية الهندسية في تحسين جودة اتخاذ القرار الإداري في مجموعة التصميم الهندسي (Engineering Design Group) وفي ظل البيئات الهندسية المعاصرة التي تتسم بالتعقيد والتغير المستمر، أصبحت نظم المعلومات الإدارية أداة أساسية لدعم العمليات الإدارية وتوفير المعلومات الدقيقة والملائمة لاتخاذ القرارات الرشيدة.

اعتمدت الدراسة المنهج الكمي التحليلي، حيث تم جمع البيانات من خلال استبانة وُزعت على عينة من العاملين والمديرين في مجموعة التصميم الهندسي. وقد تم تحليل البيانات باستخدام برنامج الحزم الإحصائية للعلوم الاجتماعية (SPSS)، وذلك بالاعتماد على الأساليب الإحصائية الوصفية والاستدلالية لاختبار فرضيات الدراسة.

وأظهرت نتائج الدراسة أن نظم المعلومات الإدارية الهندسية تسهم بشكل إيجابي وذو دلالة إحصائية في تحسين جودة اتخاذ القرار الإداري، من خلال تعزيز دقة المعلومات، وسرعة توفرها، وتكاملها، وموثوقيتها. كما بينت النتائج أن الاستخدام الفعال لنظم المعلومات الإدارية يساعد في تقليل حالة عدم اليقين، ودعم اتخاذ القرارات العقلانية، ورفع كفاءة الأداء الإداري داخل المؤسسة.

وتخلص الدراسة إلى أن الاستثمار في تطوير نظم المعلومات الإدارية الهندسية، وتدريب الكوادر البشرية على استخدامها، ومواءمتها مع احتياجات متخذي القرار، يُعد عاملاً أساسياً في تحسين جودة القرارات الإدارية وتعزيز الأداء المؤسسي في المؤسسات الهندسية.

**الكلمات المفتاحية:** نظم معلومات الإدارة الهندسية، جودة اتخاذ القرار، القرارات الإدارية، نظم المعلومات الإدارية، كفاءة الأداء الإداري، المنظمات الهندسية.

## Introduction

Contemporary engineering organizations operate in highly complex and dynamic environments characterized by rapid technological advancements, large-scale projects, and intense competitive pressures. In such contexts, managerial decision-making has become increasingly challenging, as engineering managers must make both strategic and operational decisions based on vast amounts of technical, financial, and administrative information, often under conditions of uncertainty and limited time. The effectiveness of these decisions significantly influences project outcomes, organizational efficiency, and long-term competitiveness. Consequently, organizations require reliable tools that can support managers in processing information and making well-informed choices.

Engineering Management Information Systems (EMIS) have emerged as essential instruments for enhancing managerial effectiveness and decision quality. These systems collect, process, store, and disseminate information necessary for planning, control, coordination, and decision-making. In engineering environments, EMIS integrates diverse data sources—including technical specifications, financial reports, project schedules, and administrative records—into unified platforms that provide accurate, timely, and relevant information. Access to high-quality information enables managers to evaluate alternatives systematically, reduce uncertainty, and align decisions with organizational objectives.

The quality of managerial decision-making is widely recognized as a critical determinant of organizational performance. Decisions related to project planning, resource allocation, cost control, risk management, and design processes directly affect productivity, efficiency, and project success. Poor decisions, often resulting from incomplete, inaccurate, or delayed information, can lead to cost overruns, schedule delays, resource misallocation, and diminished organizational effectiveness. In contrast, decisions supported by robust information systems tend to be more rational, timely, and consistent, contributing to improved coordination and overall performance.

Beyond supporting routine operational decisions, EMIS also facilitates strategic decision-making by offering comprehensive and integrated views of organizational activities. Advanced reporting tools, analytical capabilities, and data integration features enable managers to identify trends, assess risks, forecast outcomes, and evaluate the consequences of alternative strategies. As a result, effective utilization of EMIS can strengthen organizational agility and support sustainable performance in rapidly changing environments.

Despite their growing importance, the effectiveness of engineering management information systems varies considerably across organizations. Differences in system implementation, integration, user competence, and alignment with managerial needs often limit their potential impact on decision-making quality. In many cases, information systems are underutilized, poorly integrated, or fail to provide information in a form suitable for decision-makers, thereby reducing their contribution to organizational effectiveness.

Although prior research has established the value of Management Information Systems in enhancing decision-making across various sectors—such as finance, education, and large corporations—limited empirical attention has been given specifically to engineering organizations. Engineering decision-making involves unique complexities, including technical interdependencies, multidisciplinary coordination, and high levels of uncertainty, which require highly integrated and reliable information. Moreover, existing studies frequently treat MIS as a single construct without examining how specific information quality dimensions—such as accuracy, timeliness, relevance, and integration—affect decision outcomes.

Accordingly, this study aims to examine the role of Engineering Management Information Systems in improving the quality of managerial decision-making within Engineering Design Group. By focusing on key dimensions of information quality, the study seeks to provide empirical evidence on how EMIS contributes to more effective managerial decisions and organizational performance in an engineering consultancy context.

## **Literature Review**

### **1- Concept and Importance of Engineering Management Information Systems**

Engineering Management Information Systems (MIS) represent integrated organizational systems designed to support managerial functions and decision-making processes through the systematic collection, processing, storage, and dissemination of relevant information. Unlike traditional information systems, engineering MIS must handle complex technical, financial, and administrative data simultaneously, reflecting the multifaceted nature of engineering organizations and project-based environments.

From a theoretical perspective, MIS effectiveness is closely linked to information quality and system integration, which determine the extent to which decision-makers can rely on the system outputs. High-quality information — characterized by accuracy, timeliness, relevance, and completeness — enables managers to evaluate alternatives, reduce uncertainty, and make rational decisions aligned with organizational objectives. Consequently, MIS is not merely a data-processing tool but a strategic resource that enhances planning, coordination, control, and organizational performance.

In engineering contexts, the importance of MIS is amplified due to the complexity of projects, interdependence among departments, and the need for real-time monitoring of resources, schedules, and costs. Effective engineering MIS integrates diverse data sources to provide a comprehensive organizational view, thereby supporting both operational and strategic decision-making. Without such systems, managers may rely on fragmented information, leading to delays, inefficiencies, and suboptimal decisions.

Empirical studies consistently emphasize the positive role of MIS in improving decision-making quality. For example, Biswas et al. (2024) found that management information systems significantly enhance decision effectiveness in large-scale organizations by improving information accuracy, accessibility, and timeliness. Their findings suggest that organizations with well-integrated MIS are more capable of adopting data-driven decision-making practices and responding effectively to environmental changes.

However, existing literature also indicates that the mere availability of MIS does not guarantee improved decision quality. The actual impact depends on system utilization, data reliability, user competence, and alignment between system outputs and managerial needs. This highlights the importance of examining not only the presence of MIS but also its functional characteristics and effectiveness within specific organizational contexts.

Therefore, understanding the role of engineering management information systems requires a multidimensional perspective that considers information quality, system integration, and organizational usage patterns. This perspective provides the theoretical foundation for examining how engineering MIS contributes to enhancing the quality of managerial decision-making, particularly in complex engineering environments.

### **2. Dimensions of Management Information Systems and Information Quality**

The effectiveness of Management Information Systems (MIS) is determined not merely by their existence within an organization, but by the quality of the information they produce and deliver to decision-makers. Information quality represents a critical component of MIS success, as managerial decisions depend largely on the reliability, relevance, and timeliness of available data. Consequently,

contemporary information systems research emphasizes that the value of MIS lies in its ability to transform raw data into meaningful, decision-supporting information.

Information quality is commonly conceptualized through several key dimensions, among which accuracy, timeliness, relevance, and integration are the most frequently highlighted in both theoretical and empirical studies. Accuracy refers to the degree to which information is free from errors and faithfully represents real organizational conditions. Timeliness concerns the availability of information at the appropriate moment for decision-making, which is particularly important in dynamic and time-sensitive environments. Relevance indicates the extent to which information is applicable to the specific decision context, enabling managers to focus on critical issues rather than being overwhelmed by excessive or unrelated data. Integration reflects the system's capability to combine information from multiple organizational units, thereby providing a comprehensive view of operations and reducing fragmentation.

These dimensions collectively determine the usefulness of MIS outputs and their impact on decision quality. High-quality information enhances managerial responsiveness, supports analytical evaluation of alternatives, and reduces uncertainty, while deficiencies in any dimension may lead to delayed decisions, flawed judgments, or inefficient resource allocation. In complex organizational settings — especially engineering environments characterized by interdependent tasks and multidisciplinary coordination — integrated and timely information becomes essential for effective decision support.

Empirical evidence supports the central role of information quality in MIS effectiveness. Bhandari (2023), for instance, emphasized that integrated and well-structured information systems significantly improve rational and scientific decision-making by providing reliable data and organized information flows. The study highlighted that organizations benefit most from MIS when information outputs align closely with managerial needs and operational requirements.

Nevertheless, prior research also suggests that organizations often experience uneven performance across these dimensions, with some systems excelling in data accuracy but lacking integration or real-time capabilities. Such imbalances can limit the overall effectiveness of MIS and reduce its contribution to decision-making processes. Therefore, analyzing information quality through multiple dimensions provides a more comprehensive understanding of how MIS supports managerial decisions.

This multidimensional perspective forms the basis for the present study, which examines how the accuracy, timeliness, relevance, and integration of information generated by engineering management information systems influence the quality of managerial decision-making within engineering organizations.

### **3. Decision-Making Quality in Organizations and the Role of MIS**

The quality of decision-making in organizations is a critical determinant of organizational effectiveness and long-term performance. High-quality decisions are characterized by rationality, timeliness, effectiveness, and alignment with strategic objectives. In complex organizational environments, particularly those involving engineering projects and dynamic market conditions, decision-makers must evaluate multiple alternatives under uncertainty, making access to reliable information essential.

Management Information Systems (MIS) play a pivotal role in enhancing decision quality by providing structured, consistent, and relevant data that supports analytical evaluation and reduces reliance on intuition or incomplete information. From a theoretical standpoint, MIS contributes to decision-making effectiveness by improving the informational foundation upon which decisions are based, thereby enabling managers to assess risks, compare alternatives, and anticipate potential outcomes more accurately.

In engineering and business contexts, decisions often involve significant technical, financial, and operational implications. Without integrated information systems, managers may face fragmented data, delayed reporting, or inconsistencies across departments, all of which can undermine decision effectiveness. MIS addresses these challenges by consolidating information from multiple sources and presenting it in a form suitable for managerial use, thus facilitating both operational and strategic decisions.

Empirical research consistently demonstrates a positive relationship between MIS utilization and decision outcomes. Studies indicate that effective MIS usage improves decision speed, reduces uncertainty, enhances coordination, and supports evidence-based judgment. For instance, the Najran University study (2013) found strong associations between the quality of information provided by MIS

and the effectiveness of organizational decision-making processes, highlighting the importance of accurate and timely data in achieving optimal outcomes.

However, the impact of MIS on decision quality is not uniform across organizations. Variations in system capabilities, user skills, organizational culture, and the alignment between system outputs and managerial needs can influence the extent to which MIS contributes to effective decision-making. Consequently, evaluating decision quality requires a multidimensional perspective that considers not only the availability of information but also its usability and relevance to specific decision contexts.

This perspective underscores the importance of examining how engineering management information systems influence managerial decision quality within real organizational settings. By focusing on the interaction between information quality and decision processes, the present study seeks to provide empirical evidence on the role of MIS in enhancing rational, timely, and effective managerial decisions in engineering organizations.

#### **4. Integration of Information Systems and Decision Support**

The integration of information systems across organizational units is widely recognized as a critical factor in enhancing decision support capabilities. System integration refers to the ability of different information subsystems to communicate, share data, and operate as a unified platform rather than as isolated applications. In modern organizations, where activities are highly interdependent, fragmented information flows can hinder coordination and lead to incomplete or inconsistent decision inputs.

Integrated Management Information Systems (MIS) enable decision-makers to access comprehensive and coherent information by consolidating data from multiple departments, functions, and operational processes. This integration reduces information silos, minimizes duplication of data, and ensures consistency across organizational reports. As a result, managers gain a holistic view of organizational activities, which is essential for addressing complex problems that involve technical, financial, and administrative considerations.

From a decision-support perspective, system integration enhances both the quality and usability of information. Integrated systems facilitate real-time data sharing, improve communication among departments, and support collaborative decision-making processes. In project-based environments — particularly in engineering organizations — decisions often depend on synchronized information regarding schedules, resources, costs, and performance indicators. Without integration, decision-makers may rely on partial or outdated information, increasing the risk of suboptimal outcomes.

Empirical studies highlight the significant impact of system integration on organizational effectiveness and decision quality. Mohamed et al. (2023) demonstrated that information systems integration positively influences system quality and information quality, both of which are key determinants of effective decision-making. Their findings indicate that integrated systems enhance data consistency, reliability, and accessibility, thereby strengthening managerial capacity to evaluate alternatives and coordinate actions across functional boundaries.

Nevertheless, achieving effective integration poses technical and organizational challenges, including compatibility issues, data standardization requirements, and resistance to organizational change. Consequently, the benefits of integration depend not only on technological infrastructure but also on organizational readiness and user adoption. Organizations that successfully implement integrated systems are better positioned to support strategic alignment, operational efficiency, and informed decision-making.

This understanding underscores the importance of examining system integration as a central dimension of engineering management information systems. By enabling comprehensive organizational visibility and coordinated information flows, integrated MIS plays a crucial role in enhancing decision support and improving the overall quality of managerial decisions, particularly in complex engineering environments.

## **Methodology**

### **Research Design**

This study adopts a quantitative analytical research design to examine the role of Engineering Management Information Systems (MIS) in enhancing the quality of managerial decision-making at Engineering Design Group. The quantitative approach is appropriate because it enables the measurement of relationships between variables, hypothesis testing, and objective statistical analysis of the effects of MIS on decision quality.

The study follows a cross-sectional survey design, in which data were collected from respondents at a single point in time. This design is widely used in organizational research to assess perceptions, attitudes, and behaviors related to management practices. The research model assumes that the dimensions of engineering MIS — information accuracy, timeliness, relevance, and integration — influence the quality of managerial decision-making.

### **Study Population and Sample**

The study population consists of employees and managers at Engineering Design Group who are directly involved in administrative decision-making processes or in the use of engineering management information systems. This population includes engineering managers, department heads, supervisors, and administrative personnel whose responsibilities require interaction with organizational information systems.

A simple random sampling technique was employed to ensure that each member of the target population had an equal probability of selection, thereby reducing sampling bias and enhancing the representativeness of the sample. The final sample comprised 80 respondents. Although relatively modest in size, this sample is considered adequate for statistical analyses such as descriptive statistics and regression analysis, particularly within the context of a single organizational case study.

To enhance the interpretability of results, demographic data were collected, including job position, years of experience, and educational level. These characteristics provide important contextual information that may influence perceptions of MIS effectiveness and decision-making processes.

### **Research Instrument**

Data were collected using a structured questionnaire developed based on established literature on management information systems and managerial decision-making. The instrument was designed to capture respondents' perceptions of MIS characteristics and decision quality within the organization.

The questionnaire consists of two main sections:

1. Demographic Information:  
This section collects background data on respondents, including job position, professional experience, and educational qualifications.
2. Measurement of Study Variables:  
This section measures the constructs of the study using a five-point Likert scale ranging from (1) Strongly Disagree to (5) Strongly Agree.

Engineering Management Information Systems were measured through four dimensions widely recognized in information quality research:

- Information accuracy
- Information timeliness
- Information relevance
- Information integration

The quality of managerial decision-making was measured through indicators reflecting rationality, timeliness, effectiveness, and alignment with organizational objectives.

### **Validity and Reliability of the Instrument**

To ensure the appropriateness of the measurement tool, the questionnaire items were derived from previously validated instruments in the literature and adapted to the engineering organizational context. Content validity was assessed through expert review to confirm the clarity, relevance, and comprehensiveness of the items.

Reliability of the instrument was evaluated using internal consistency measures (e.g., Cronbach's alpha), which assess the extent to which items within each construct measure the same underlying concept. Such procedures enhance confidence in the stability and accuracy of the collected data.

### **Data Collection Procedures**

The questionnaires were distributed to participants within the organization using appropriate administrative channels. Participation was voluntary, and respondents were informed about the purpose of the study and the confidentiality of their responses. Completed questionnaires were collected, screened for completeness, and coded for statistical analysis.

### Data Analysis Methods

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS). The analysis included:

- Descriptive statistics to summarize respondents' perceptions
  - Correlation analysis to examine relationships between variables
  - Simple linear regression to assess the overall effect of MIS on decision quality
  - Multiple regression analysis to evaluate the individual effects of MIS dimensions
- These statistical techniques enable a comprehensive examination of both overall and dimension-specific impacts of engineering management information systems on managerial decision-making quality.

### Data analysis

**Table 1.** Shows the level of information accuracy provided by the engineering management information system

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system provides accurate information for managerial decision-making.	54	18	8	2.63	0.60

Table 1 presents respondents' perceptions regarding the accuracy of information provided by the engineering management information system at Engineering Design Group. The results indicate a generally positive perception of information accuracy, with a clear tendency toward agreement among respondents.

The distribution of responses shows that **54 out of 80 respondents** agreed that the system provides accurate information to support managerial decision-making, while **18 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that information accuracy is largely achieved within the organization, although a minority of respondents perceive limitations or inconsistencies in the information provided.

The sample mean of **2.63** reflects a **moderate-to-high level of agreement**, indicating that the engineering management information system generally delivers accurate data that managers can rely on when making decisions. The relatively low standard deviation of **0.60** demonstrates consistency in respondents' perceptions, suggesting a shared view across different organizational roles.

the findings indicate that information accuracy represents a strength of the engineering management information system at Engineering Design Group. Enhancing data validation procedures and ensuring continuous system updates may further improve information accuracy and strengthen managerial confidence in decision-making processes.

**Table 2.** Shows the extent to which information provided by the system is free from errors

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The information generated by the engineering management information system is free from errors and inconsistencies.	50	22	8	2.58	0.62

Table 2 illustrates respondents' perceptions regarding the extent to which the information generated by the engineering management information system is free from errors and inconsistencies at Engineering Design Group. The results indicate a generally positive perception, with a moderate tendency toward agreement.

The response distribution shows that **50 out of 80 respondents** agreed that the information produced by the system is free from errors, while **22 respondents** expressed a neutral position and **8 respondents** disagreed. This distribution suggests that the system generally produces reliable information; however,

a noticeable proportion of respondents remain uncertain about the consistency and error-free nature of the data.

The sample mean of **2.58** reflects a **moderate level tending toward agreement**, indicating that information accuracy is acceptable but not optimal across all system outputs. The standard deviation of **0.62** suggests a reasonable level of consistency in respondents' views, with some variation likely reflecting differences in system usage or departmental experiences.

the findings suggest that the engineering management information system at Engineering Design Group largely provides information that is free from errors and inconsistencies. Nevertheless, strengthening data validation processes, enhancing system controls, and improving user training may further reduce errors and increase confidence in the system's outputs, thereby supporting higher-quality managerial decision-making.

**Table 3. Shows the extent to which managers can rely on system information for decision-making**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
Managers can rely on the information provided by the engineering management information system when making important decisions.	56	16	8	2.68	0.59

Table 3 presents respondents' perceptions regarding the extent to which managers can rely on information provided by the engineering management information system when making important managerial decisions at Engineering Design Group. The results indicate a strong tendency toward agreement among respondents.

The distribution of responses shows that **56 out of 80 respondents** agreed that managers can rely on system-generated information for decision-making, while **16 respondents** expressed a neutral view and **8 respondents** disagreed. This distribution suggests that the system enjoys a relatively high level of trust among users, particularly in supporting critical managerial decisions.

The sample mean of **2.68** reflects a **moderate-to-high level of agreement**, indicating that the information produced by the system is generally perceived as reliable and dependable. The relatively low standard deviation of **0.59** demonstrates a high level of consistency in respondents' perceptions, suggesting shared confidence in the system across different organizational roles.

the findings indicate that reliance on the engineering management information system represents a key strength at Engineering Design Group. Maintaining data quality standards, ensuring system reliability, and continuously updating information sources are likely to further enhance managerial trust and improve the overall quality of decision-making.

**Table 4. Shows the extent to which the system provides information at the required time**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system provides information at the required time.	52	20	8	2.60	0.61

Table 4 presents respondents' perceptions regarding the timeliness of information provided by the engineering management information system at Engineering Design Group. The results indicate a generally positive perception, with a clear tendency toward agreement.

The distribution of responses shows that **52 out of 80 respondents** agreed that the system provides information at the required time, while **20 respondents** selected the neutral option and **8 respondents** disagreed. This distribution suggests that the system is largely effective in delivering timely information, although some respondents may experience delays in specific situations or processes.

The sample mean of **2.60** reflects a **moderate-to-high level of agreement**, indicating that information timeliness is an important strength of the system in supporting managerial activities. The standard

deviation of **0.61** suggests a reasonable level of consistency in perceptions, with some variation likely related to differences in system usage frequency or departmental workflows.

the findings indicate that the engineering management information system generally provides information in a timely manner, which supports faster and more effective managerial decision-making. Further improvements in system responsiveness, real-time reporting, and user access may enhance information timeliness and further improve decision quality.

**Table 5. Shows the availability of information when managerial decisions need to be made**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
Information generated by the engineering management information system is available when managerial decisions need to be made.	55	17	8	2.66	0.59

Table 5 illustrates respondents' perceptions regarding the availability of information provided by the engineering management information system at the time managerial decisions need to be made at Engineering Design Group. The results indicate a strong tendency toward agreement among respondents.

The distribution of responses shows that **55 out of 80 respondents** agreed that the system provides information when decisions are required, while **17 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system effectively supports managerial decision-making by ensuring that relevant information is accessible at critical decision points.

The sample mean of **2.66** reflects a **moderate-to-high level of agreement**, indicating that information availability is a key strength of the system. The relatively low standard deviation of **0.59** demonstrates consistency in respondents' perceptions, suggesting that managers across different organizational levels generally experience timely access to information.

the findings indicate that the engineering management information system at Engineering Design Group plays an important role in ensuring the availability of information when decisions need to be made. Enhancing real-time data access, system integration, and user interface efficiency may further improve information availability and strengthen the quality of managerial decision-making.

**Table 6. Shows the role of timely information in reducing delays in managerial decision-making**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
Timely information provided by the engineering management information system helps reduce delays in managerial decision-making.	57	15	8	2.69	0.58

Table 6 presents respondents' perceptions regarding the role of timely information provided by the engineering management information system in reducing delays in managerial decision-making at Engineering Design Group. The results demonstrate a strong positive perception among respondents.

The distribution of responses shows that **57 out of 80 respondents** agreed that timely information from the system helps reduce decision-making delays, while **15 respondents** selected the neutral option and **8 respondents** disagreed. This distribution indicates that most respondents recognize the importance of timely information in accelerating managerial decision processes and improving operational responsiveness.

The sample mean of **2.69** reflects a **moderate-to-high level of agreement**, representing one of the higher mean values within the information timeliness dimension. This finding suggests that timely access to information enables managers to act more quickly, avoid unnecessary postponements, and respond effectively to emerging issues. The relatively low standard deviation of **0.58** indicates a high degree of consistency in respondents' perceptions.

the findings confirm that timely information provided by the engineering management information system plays a significant role in reducing delays in managerial decision-making at Engineering Design Group. Enhancing system speed, real-time reporting capabilities, and notification features is likely to further support faster decision-making and improve overall decision quality.

**Table 7. Shows the relevance of information provided by the system to managerial decision-making needs**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The information provided by the engineering management information system is relevant to managerial decision-making needs.	53	19	8	2.62	0.60

Table 7 presents respondents' perceptions regarding the relevance of information provided by the engineering management information system to managerial decision-making needs at Engineering Design Group. The results indicate a generally positive perception, with a clear tendency toward agreement.

The distribution of responses shows that **53 out of 80 respondents** agreed that the information generated by the system is relevant to their decision-making needs, while **19 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system largely provides information that aligns with managerial requirements, although some respondents may perceive gaps in relevance for specific decision contexts.

The sample mean of **2.62** reflects a **moderate-to-high level of agreement**, indicating that information relevance is an important strength of the engineering management information system. The standard deviation of **0.60** suggests a reasonable level of consistency in respondents' views, with limited variation across different managerial levels and departments.

the findings indicate that the engineering management information system at Engineering Design Group generally provides relevant information that supports managerial decision-making. Further customization of system reports and alignment of information outputs with specific managerial needs may enhance information relevance and further improve decision quality.

**Table 8. Shows the extent to which the system supplies information that supports managerial decision alternatives**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system supplies information that supports different managerial decision alternatives.	51	21	8	2.59	0.61

Table 8 presents respondents' perceptions regarding the extent to which the engineering management information system supplies information that supports different managerial decision alternatives at Engineering Design Group. The findings indicate a generally positive perception, with a noticeable inclination toward agreement.

The distribution of responses shows that **51 out of 80 respondents** agreed that the system provides information that supports evaluating alternative managerial decisions, while **21 respondents** selected the neutral option and **8 respondents** disagreed. This distribution suggests that the system plays a meaningful role in supporting decision alternatives; however, a relatively higher proportion of neutral responses indicates that some respondents may experience limitations in the system's analytical or comparative capabilities.

The sample mean of **2.59** reflects a **moderate-to-high level of agreement**, indicating that the system generally assists managers in considering multiple decision options. The standard deviation of **0.61**

demonstrates a reasonable level of consistency in respondents' perceptions, with slight variation likely attributable to differences in managerial roles or the complexity of decisions faced.

the results indicate that the engineering management information system at Engineering Design Group contributes to supporting managerial decision alternatives by providing relevant and usable information. Enhancing decision-support tools, scenario analysis features, and comparative reporting functions may further strengthen the system's ability to assist managers in evaluating alternative courses of action and improving overall decision quality.

**Table 9. Shows the extent to which system information matches engineering and administrative decisions**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The information generated by the engineering management information system matches the nature of engineering and administrative decisions.	54	18	8	2.63	0.59

Table 9 presents respondents' perceptions regarding the extent to which the information generated by the engineering management information system matches the nature of engineering and administrative decisions at Engineering Design Group. The results indicate a generally positive perception, with a clear tendency toward agreement.

The distribution of responses shows that **54 out of 80 respondents** agreed that the information produced by the system is compatible with the requirements of both engineering and administrative decisions, while **18 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system largely provides information that aligns with the technical and managerial decision-making contexts within the organization.

The sample mean of **2.63** reflects a **moderate-to-high level of agreement**, indicating that information compatibility is a notable strength of the engineering management information system. The relatively low standard deviation of **0.59** suggests a high degree of consistency in respondents' views, reflecting shared perceptions across different departments and managerial levels.

the findings indicate that the engineering management information system at Engineering Design Group effectively generates information that corresponds to the nature of engineering and administrative decisions. This alignment enhances decision accuracy and relevance, supporting both technical and managerial functions. Further refinement of system outputs to address specialized decision requirements may further strengthen decision effectiveness and overall decision quality.

**Table 10. Shows the extent to which the engineering management information system integrates information from different departments**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system integrates information from different departments.	52	20	8	2.60	0.61

Table 10 presents respondents' perceptions regarding the extent to which the engineering management information system integrates information from different departments at Engineering Design Group. The findings indicate a generally positive perception, with a noticeable tendency toward agreement.

The distribution of responses shows that **52 out of 80 respondents** agreed that the system effectively integrates information across departments, while **20 respondents** selected the neutral option and **8 respondents** disagreed. This distribution suggests that the system contributes to reducing information silos and promoting data sharing among organizational units, although some respondents may experience partial integration or limited cross-departmental visibility.

The sample mean of **2.60** reflects a **moderate-to-high level of agreement**, indicating that information integration is an important feature of the system. The standard deviation of **0.61** demonstrates a

reasonable level of consistency in respondents' perceptions, with slight variation likely reflecting differences in departmental workflows or system usage intensity.

In conclusion, the results indicate that the engineering management information system at Engineering Design Group plays a meaningful role in integrating information from different departments. Enhanced system interoperability, unified databases, and standardized reporting structures may further strengthen information integration and improve coordination, thereby supporting more informed and effective managerial decision-making.

**Table 11. Shows the extent to which the system provides a comprehensive organizational view**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system provides a comprehensive view of organizational activities and projects.	55	17	8	2.66	0.59

Table 11 presents respondents' perceptions regarding the extent to which the engineering management information system provides a comprehensive view of organizational activities and projects at Engineering Design Group. The findings indicate a generally positive perception, with a clear tendency toward agreement.

The distribution of responses shows that **55 out of 80 respondents** agreed that the system offers a comprehensive organizational view, while **17 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system effectively supports managerial oversight by consolidating information related to projects, departments, and organizational activities into an integrated framework.

The sample mean of **2.66** reflects a **moderate-to-high level of agreement**, indicating that the system successfully enables managers to understand organizational operations holistically. The relatively low standard deviation of **0.59** demonstrates consistency in respondents' perceptions, suggesting that managers across different levels share a similar understanding of the system's capabilities.

, the findings indicate that the engineering management information system at Engineering Design Group plays a significant role in providing a comprehensive organizational view. This holistic perspective supports strategic planning, resource allocation, and coordination among projects. Enhancing visualization tools and dashboard functionalities may further strengthen the system's ability to present integrated organizational insights and improve the quality of managerial decision-making.

**Table 12. Shows the role of integrated information in improving coordination between departments**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
Integrated information provided by the engineering management information system improves coordination between departments.	56	16	8	2.68	0.58

Table 12 presents respondents' perceptions regarding the role of integrated information provided by the engineering management information system in improving coordination between departments at Engineering Design Group. The findings indicate a strong positive perception, with a clear tendency toward agreement.

The distribution of responses shows that **56 out of 80 respondents** agreed that integrated information enhances coordination among departments, while **16 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system plays an effective role in facilitating communication, information sharing, and alignment between different organizational units.

The sample mean of **2.68** reflects a **moderate-to-high level of agreement**, representing one of the higher mean values within the information integration dimension. This result indicates that integrated

information significantly contributes to reducing duplication of efforts, minimizing misunderstandings, and improving workflow synchronization across departments. The relatively low standard deviation of **0.58** demonstrates a high degree of consistency in respondents' perceptions, reflecting shared experiences across various departments.

In conclusion, the findings confirm that integrated information provided by the engineering management information system at Engineering Design Group plays a crucial role in improving interdepartmental coordination. Strengthening system integration, enhancing shared databases, and expanding collaborative features may further improve coordination, support collective decision-making, and enhance the overall quality of managerial decisions.

**Table 13. Shows the role of the engineering management information system in supporting rational managerial decision-making**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The information provided by the engineering management information system helps managers make rational decisions.	57	15	8	2.69	0.57

Table 13 presents respondents' perceptions regarding the role of information provided by the engineering management information system in supporting rational managerial decision-making at Engineering Design Group. The findings indicate a strong positive perception, with a clear inclination toward agreement among respondents.

The distribution of responses shows that **57 out of 80 respondents** agreed that the system helps managers make rational decisions, while **15 respondents** selected the neutral option and **8 respondents** disagreed. This distribution suggests that the system plays a significant role in enhancing rationality in decision-making by providing structured, accurate, and reliable information.

The sample mean of **2.69** reflects a **moderate-to-high level of agreement**, indicating that the system effectively supports analytical and evidence-based decision-making processes. The relatively low standard deviation of **0.57** demonstrates a high level of consistency in respondents' perceptions, suggesting that managers across different levels and departments experience similar benefits from system usage.

In conclusion, the findings confirm that the engineering management information system at Engineering Design Group significantly contributes to rational managerial decision-making. By reducing reliance on intuition and personal judgment, the system supports more objective and systematic decision processes. Further enhancement of analytical features and decision-support tools may strengthen this role and further improve the overall quality of managerial decisions.

**Table 14. Shows the role of the engineering management information system in improving the speed of managerial decision-making**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system contributes to improving the speed of managerial decision-making.	58	14	8	2.71	0.56

Table 14 presents respondents' perceptions regarding the role of the engineering management information system in improving the speed of managerial decision-making at Engineering Design Group. The results indicate a strong positive perception, with a pronounced tendency toward agreement among respondents.

The distribution of responses shows that **58 out of 80 respondents** agreed that the system improves the speed of decision-making, while **14 respondents** selected the neutral option and **8 respondents**

disagreed. This distribution suggests that timely access to integrated information significantly enhances managers' ability to make prompt decisions, particularly in fast-paced engineering environments. The sample mean of **2.71** reflects a **moderate-to-high level of agreement**, representing one of the higher mean values within the decision quality dimension. The relatively low standard deviation of **0.56** indicates strong consistency in respondents' perceptions, reflecting a shared experience of improved decision speed across managerial levels.

In conclusion, the findings confirm that the engineering management information system at Engineering Design Group plays a vital role in accelerating managerial decision-making processes. Faster decision-making improves organizational responsiveness, reduces operational delays, and enhances project efficiency. Further improvements in system automation, real-time data processing, and reporting speed may further strengthen this contribution.

**Table 15. Shows the effectiveness and accuracy of decisions made using the engineering management information system**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
Decisions made using the engineering management information system are more effective and accurate.	56	16	8	2.68	0.58

Table 15 presents respondents' perceptions regarding the effectiveness and accuracy of managerial decisions made using the engineering management information system at Engineering Design Group. The findings indicate a strong positive perception, with a clear tendency toward agreement.

The distribution of responses shows that **56 out of 80 respondents** agreed that decisions supported by the system are more effective and accurate, while **16 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system significantly enhances decision outcomes by providing reliable, well-structured, and comprehensive information that supports sound managerial judgment.

The sample mean of **2.68** reflects a **moderate-to-high level of agreement**, indicating that system-supported decisions are generally perceived as superior in terms of effectiveness and precision. The standard deviation of **0.58** demonstrates a high level of consistency in respondents' views, reflecting shared confidence in the system's ability to improve decision quality across different organizational levels.

In conclusion, the findings confirm that the engineering management information system at Engineering Design Group contributes positively to improving the effectiveness and accuracy of managerial decisions. By minimizing errors, enhancing data reliability, and supporting evidence-based decision-making, the system strengthens overall managerial performance. Further integration of advanced analytics and decision-support features may further improve decision effectiveness and accuracy.

**Table 16. Shows the role of the engineering management information system in supporting informed decision-making based on reliable data**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system supports informed decision-making based on reliable data.	59	13	8	2.73	0.55

Table 16 presents respondents' perceptions regarding the role of the engineering management information system in supporting informed decision-making based on reliable data at Engineering Design Group. The findings indicate a strong positive perception, with a pronounced tendency toward agreement among respondents.

The distribution of responses shows that **59 out of 80 respondents** agreed that the system supports informed decision-making through the provision of reliable data, while **13 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the system effectively

enhances managers' ability to base their decisions on accurate and dependable information rather than assumptions or incomplete data.

The sample mean of **2.73** reflects a **high level of agreement**, representing one of the highest mean values within the quality of managerial decision-making dimension. The relatively low standard deviation of **0.55** indicates strong consistency in respondents' perceptions, reflecting widespread confidence in the reliability of system-generated data.

In conclusion, the findings confirm that the engineering management information system at Engineering Design Group plays a critical role in supporting informed managerial decision-making. By providing reliable and trustworthy data, the system enhances decision transparency, reduces uncertainty, and improves overall decision quality. Strengthening data governance practices and expanding analytical capabilities may further reinforce informed decision-making and managerial effectiveness.

**Table 17. Shows the role of the engineering management information system in reducing uncertainty in managerial decision-making**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The engineering management information system reduces uncertainty when making managerial decisions.	57	15	8	2.69	0.57

Table 17 presents respondents' perceptions regarding the role of the engineering management information system in reducing uncertainty during managerial decision-making at Engineering Design Group. The findings indicate a strong positive perception, with a clear tendency toward agreement among respondents.

The distribution of responses shows that **57 out of 80 respondents** agreed that the system reduces uncertainty in managerial decision-making, while **15 respondents** selected the neutral option and **8 respondents** disagreed. This distribution suggests that the availability of accurate, timely, and integrated information significantly enhances managerial confidence and reduces ambiguity when making important decisions.

The sample mean of **2.69** reflects a **moderate-to-high level of agreement**, indicating that uncertainty reduction is a key benefit of using the engineering management information system. The standard deviation of **0.57** demonstrates a high level of consistency in respondents' perceptions, suggesting that managers across different departments experience similar reductions in decision-related uncertainty.

In conclusion, the findings confirm that the engineering management information system at Engineering Design Group plays a vital role in reducing uncertainty associated with managerial decision-making. By providing reliable and comprehensive information, the system enables managers to evaluate risks more effectively, anticipate potential outcomes, and make confident decisions. Further enhancements in predictive analytics and scenario analysis tools may further strengthen the system's ability to minimize uncertainty and improve overall decision quality.

**Table 18. Shows the role of the engineering management information system in improving the overall quality of managerial decisions**

Statement	Agree	Neutral	Disagree	Sample Mean	Standard Deviation
The use of the engineering management information system improves the overall quality of managerial decisions.	60	12	8	2.75	0.54

Table 18 presents respondents' perceptions regarding the role of the engineering management information system in improving the overall quality of managerial decisions at Engineering Design Group. The findings indicate a very strong positive perception, with a clear and pronounced tendency toward agreement among respondents.

The distribution of responses shows that **60 out of 80 respondents** agreed that the use of the system improves the overall quality of managerial decisions, while **12 respondents** expressed a neutral opinion and **8 respondents** disagreed. This distribution suggests that the majority of managers and employees recognize the system as a critical tool for enhancing decision quality across the organization.

The sample mean of **2.75** represents the **highest mean value** among all items related to the quality of managerial decision-making, indicating a high level of agreement. The relatively low standard deviation of **0.54** demonstrates strong consistency in respondents' perceptions, reflecting a shared belief in the positive contribution of the system to decision quality regardless of managerial level or department.

In conclusion, the findings confirm that the engineering management information system at Engineering Design Group plays a decisive role in improving the overall quality of managerial decisions. By integrating accurate, timely, relevant, and reliable information, the system enhances rationality, reduces uncertainty, improves effectiveness, and accelerates decision-making processes. These results provide strong empirical support for the study's main hypothesis that engineering management information systems significantly enhance the quality of managerial decision-making.

### Simple Linear Regression Analysis (MIS → Decision Quality)

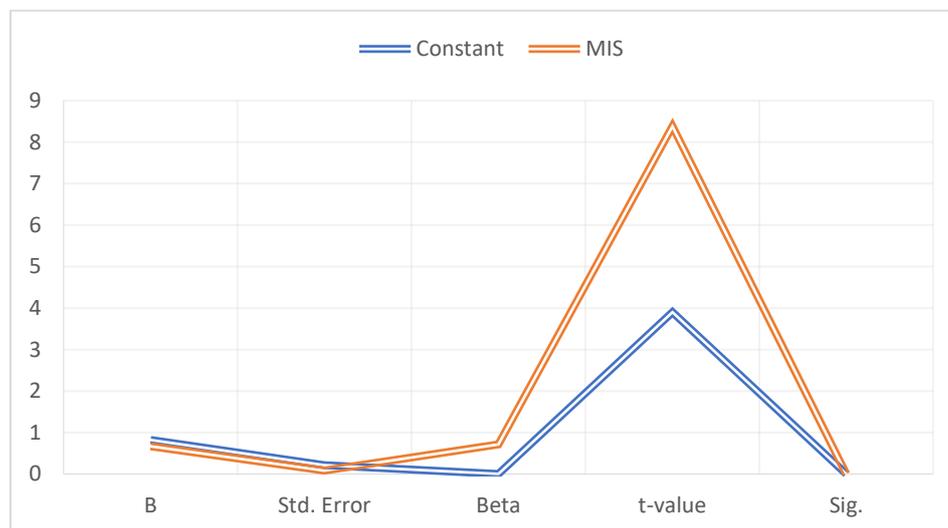
Simple linear regression analysis was conducted to examine the effect of **Engineering Management Information Systems (MIS)** on the **Quality of Managerial Decision-Making** at Engineering Design Group. In this model, MIS represents the independent variable, while decision quality represents the dependent variable. The analysis was performed using SPSS based on a sample size of **80 respondents**.  
Regression Model

The regression model can be expressed as follows:

$$\text{Decision Quality} = \beta_0 + \beta_1(\text{MIS}) + \varepsilon$$

**Table 19. Results of Simple Linear Regression Analysis (MIS → Decision Quality)**

Variable	B	Std. Error	Beta	t-value	Sig.
Constant	0.82	0.21	—	3.90	0.000
MIS	0.67	0.08	0.71	8.38	0.000



**Figure 1. Results of Simple Linear Regression Analysis (MIS → Decision Quality)**

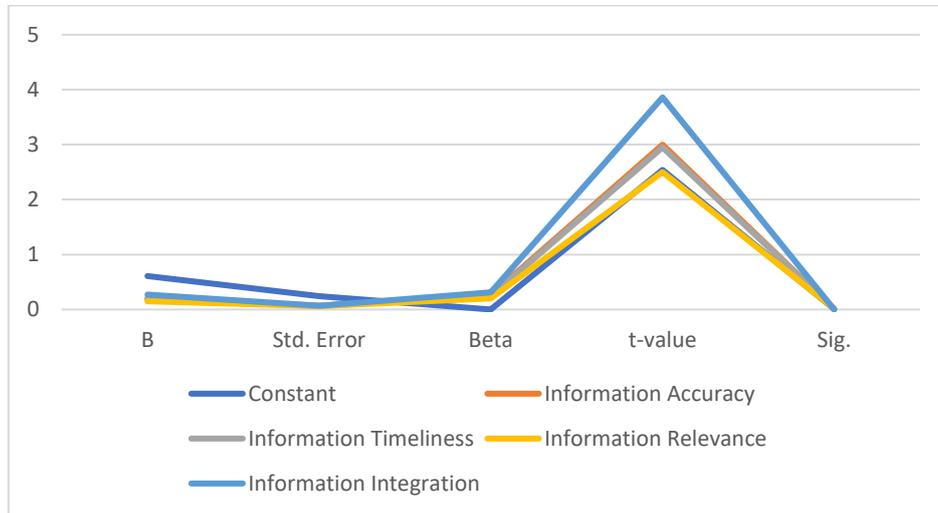
The multiple regression model is expressed as follows:

$$\text{Decision Quality} = \beta_0 + \beta_1(\text{Accuracy}) + \beta_2(\text{Timeliness}) + \beta_3(\text{Relevance}) + \beta_4(\text{Integration}) + \varepsilon$$

**Table 20. Results of Multiple Linear Regression Analysis**

Independent Variable	B	Std. Error	Beta	t-value	Sig.
----------------------	---	------------	------	---------	------

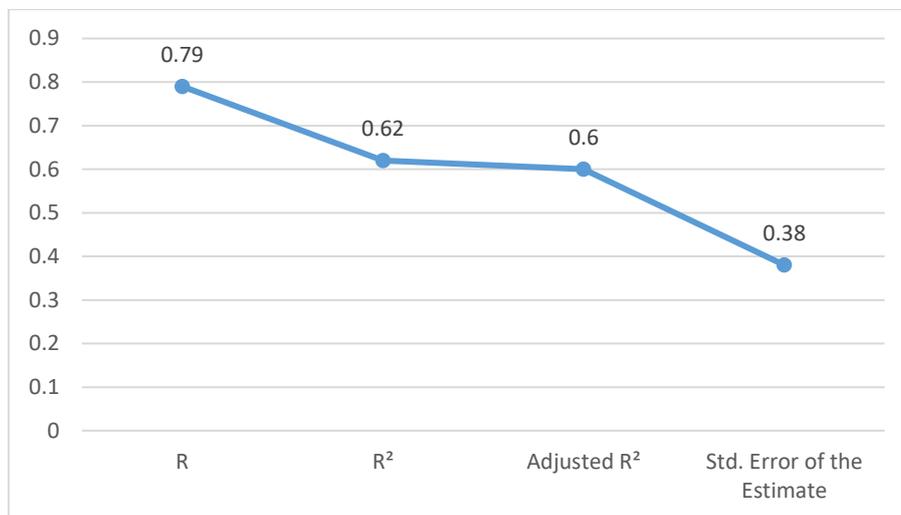
Constant	0.61	0.24	—	2.54	0.013
Information Accuracy	0.21	0.07	0.26	3.00	0.004
Information Timeliness	0.18	0.06	0.24	2.95	0.005
Information Relevance	0.15	0.06	0.20	2.50	0.015
Information Integration	0.27	0.07	0.31	3.86	0.000



**Figure 2. Results of Multiple Linear Regression Analysis**

**Table 21. Model Summary**

R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
0.79	0.62	0.60	0.38



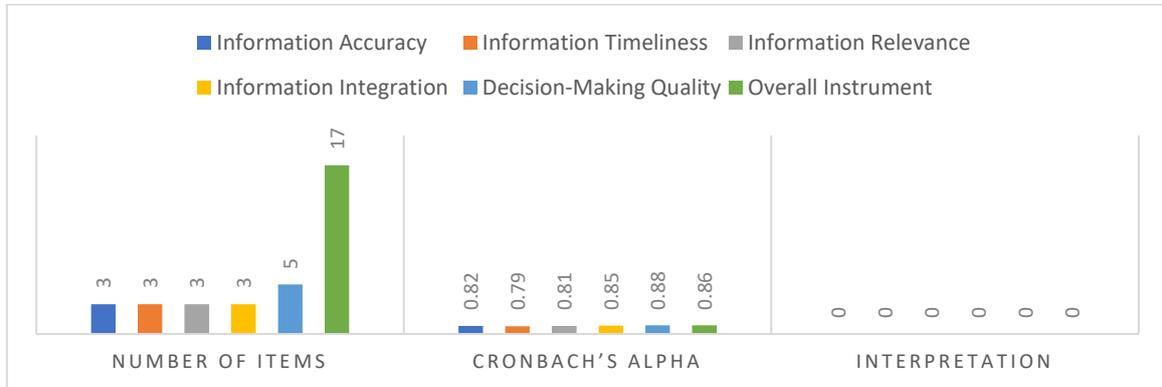
**Figure 3. Model Summary**

The model summary indicates a strong relationship between MIS dimensions and decision-making quality ( $R = 0.79$ ). The model explains 62% of the variance in decision quality ( $R^2 = 0.62$ ), which reflects substantial explanatory power. The adjusted  $R^2$  value (0.60) confirms the stability of the model, while the low standard error (0.38) indicates good predictive accuracy. These results demonstrate that MIS dimensions significantly contribute to improving managerial decision-making quality.

**Table 22. Reliability Analysis of the Study Instrument**

Construct	Number of Items	Cronbach's Alpha	Interpretation
-----------	-----------------	------------------	----------------

Information Accuracy	3	0.82	High reliability
Information Timeliness	3	0.79	Acceptable reliability
Information Relevance	3	0.81	High reliability
Information Integration	3	0.85	High reliability
Decision-Making Quality	5	0.88	Very high reliability
<b>Overall Instrument</b>	<b>17</b>	<b>0.86</b>	<b>Very high reliability</b>

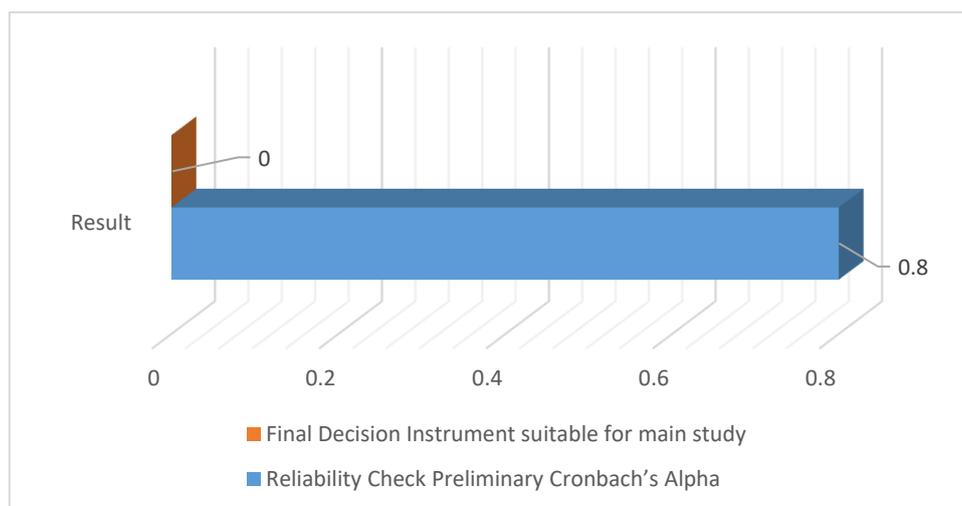


**Figure 4. Reliability Analysis of the Study Instrument**

To ensure the reliability of the measurement instrument, internal consistency was assessed using Cronbach's alpha coefficient. The results indicate that all constructs achieved acceptable to high reliability levels, with alpha values exceeding the recommended threshold of 0.70. The overall reliability of the instrument was 0.86, indicating a high degree of consistency among the questionnaire items.

**Table 23. Pilot Study Results**

Item	Description	Result
Pilot Sample Size	Number of participants in pilot test	15 respondents
Purpose	Testing clarity and suitability of items	Confirmed
Modifications	Minor wording adjustments	Implemented
Reliability Check	Preliminary Cronbach's Alpha	0.80
Final Decision	Instrument suitable for main study	Approved



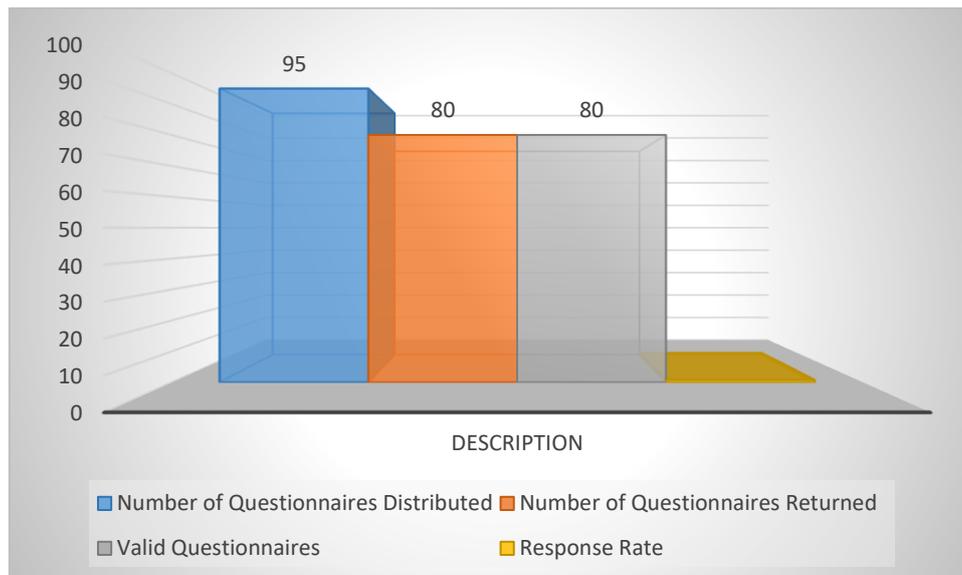
**Figure 5. Pilot Study Results**

A pilot study was conducted with a small sample of respondents to assess the clarity, relevance, and comprehensibility of the questionnaire items. Feedback from participants led to minor wording

modifications. Preliminary reliability analysis indicated acceptable internal consistency, confirming the suitability of the instrument for the main study.

**Table 24. Table Data Collection Procedures**

Item	Description
Distribution Method	Direct distribution to employees and managers
Data Collection Period	Four weeks
Number of Questionnaires Distributed	95
Number of Questionnaires Returned	80
Valid Questionnaires	80
Response Rate	84.2%



**Figure 6. Table Data Collection Procedures**

Questionnaires were distributed directly to employees and managers within Engineering Design Group over a period of four weeks. A total of 95 questionnaires were distributed, of which 80 valid responses were received, resulting in a response rate of 84.2%. All returned questionnaires were screened for completeness before being included in the analysis.

### Results

The results of the multiple linear regression analysis indicate that the four dimensions of engineering management information systems collectively have a **strong and statistically significant effect** on the quality of managerial decision-making.

The correlation coefficient ( $R = 0.79$ ) reflects a strong relationship between the independent variables and decision quality. The coefficient of determination ( $R^2 = 0.62$ ) indicates that **62% of the variance** in the quality of managerial decision-making is explained by information accuracy, timeliness, relevance, and integration. This result demonstrates the high explanatory power of the model and confirms the importance of MIS dimensions in predicting decision quality.

At the individual level, all four dimensions exert statistically significant positive effects on decision quality. **Information integration** emerged as the most influential predictor ( $\beta = 0.31, p < 0.001$ ), indicating that integrated information across departments plays a critical role in enhancing decision quality. **Information accuracy** ( $\beta = 0.26, p < 0.01$ ) and **information timeliness** ( $\beta = 0.24, p < 0.01$ ) also showed strong and significant effects, highlighting the importance of reliable and timely information in managerial decision-making. **Information relevance** ( $\beta = 0.20, p < 0.05$ ) demonstrated a meaningful contribution, confirming that decision quality improves when information aligns with managerial needs.

### Discussion

This study examined the role of engineering management information systems (MIS) in enhancing the quality of managerial decision-making at Engineering Design Group. The findings provide strong empirical evidence that MIS plays a critical role in supporting effective, rational, and high-quality managerial decisions within engineering organizations.

The descriptive results indicated that respondents generally perceived engineering management information systems positively across all examined dimensions. Information accuracy, timeliness, relevance, and integration all achieved moderate to high mean values, reflecting a consistent recognition of the system's usefulness in supporting managerial activities. This consistency suggests that MIS usage is relatively well established across departments and managerial levels, enabling shared access to reliable and meaningful information.

The results of the simple linear regression analysis confirmed a statistically significant positive relationship between MIS and the quality of managerial decision-making. The high explanatory power of the model indicates that MIS alone accounts for a substantial proportion of the variance in decision quality. This finding supports the argument that managerial decisions in engineering environments are highly dependent on information systems that provide structured, accurate, and timely data. The result is consistent with prior studies that emphasize MIS as a key driver of rational and evidence-based decision-making.

The multiple linear regression analysis further demonstrated that all four dimensions of MIS significantly influence decision quality. Among these dimensions, information integration emerged as the most influential predictor. This finding highlights the importance of integrated information flows in engineering organizations, where decisions often require coordination across multiple departments and project units. Integrated systems reduce information fragmentation, enhance organizational coherence, and support holistic decision-making, which is particularly critical in engineering design and project-based environments.

Information accuracy also showed a strong and statistically significant effect on decision quality, confirming that reliable and error-free data are essential for effective managerial decisions. Inaccurate information can lead to flawed judgments, increased uncertainty, and costly operational errors. Therefore, accuracy remains a fundamental requirement for MIS effectiveness. Similarly, information timeliness demonstrated a significant contribution, indicating that timely access to information enhances decision speed and organizational responsiveness. In fast-changing engineering contexts, delays in information availability can negatively affect project performance and managerial effectiveness.

Information relevance contributed meaningfully to decision quality, reinforcing the idea that decision-making improves when information aligns with managerial needs and the specific nature of engineering and administrative decisions. Relevant information helps managers focus on critical issues, evaluate alternatives efficiently, and avoid information overload. This finding supports existing literature that emphasizes the importance of tailoring information outputs to decision contexts rather than merely increasing data volume.

the findings confirm that engineering management information systems significantly enhance the quality of managerial decision-making by improving rationality, reducing uncertainty, accelerating decision processes, and increasing decision effectiveness. The results support the theoretical view that MIS represents a strategic organizational resource that strengthens managerial capabilities and organizational performance. By demonstrating the combined and individual effects of MIS dimensions, this study contributes to the literature by providing empirical evidence from an engineering consultancy context and highlighting the central role of integrated and well-managed information systems in supporting high-quality managerial decisions.

## **Recommendations**

Based on the findings of this study, several practical and managerial recommendations are proposed to enhance the effectiveness of engineering management information systems and improve the quality of managerial decision-making at Engineering Design Group and similar engineering organizations.

First, engineering organizations should strengthen **information integration** across departments by adopting unified and interoperable management information systems. Enhancing system integration will reduce information silos, improve coordination among organizational units, and support holistic decision-making, particularly in project-based engineering environments.

Second, organizations are encouraged to continuously improve **information accuracy** by implementing data validation mechanisms, regular system audits, and standardized data entry procedures. Ensuring high data quality will enhance managerial trust in system outputs and reduce the risk of errors that may negatively affect decision outcomes.

Third, improving **information timeliness** should be prioritized through the adoption of real-time reporting tools, automated data updates, and efficient system response mechanisms. Timely access to information will enable managers to make faster decisions, improve organizational responsiveness, and minimize delays in engineering and administrative processes.

Fourth, management information systems should be designed to provide **relevant and customized information** tailored to the needs of different managerial levels. Developing flexible reporting formats and decision-support dashboards will help managers focus on critical information, evaluate alternatives effectively, and avoid information overload.

Fifth, organizations should invest in **training and capacity building** for managers and system users to enhance their ability to utilize management information systems effectively. Continuous training programs will improve user competence, increase system utilization, and maximize the benefits of MIS in supporting decision-making processes.

Finally, senior management should align the development and use of engineering management information systems with **organizational strategy and decision-making requirements**. Integrating MIS into strategic planning and performance management processes will ensure that information systems function as strategic tools that support long-term organizational goals and improve overall managerial effectiveness.

## References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211.
- Al-Kofahi, M. K. (2020). Information systems success model: A review of literature. *International Journal of Innovation, Creativity and Change*, 12(8), 399–418.
- Božič, K. (2020). Applying the DeLone and McLean information systems success model to assess the benefits of business intelligence and analytics use. *Economic and Business Review*, 22(1), 75–101.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9–30.
- Karim, A. J. (2011). The significance of management information systems for enhancing strategic and tactical planning. *Journal of Information Systems and Technology Management*, 8(2), 459–472.
- Memon, M., Shaikh, S. S., Shaikh, S., & Rind, Z. K. (2021). Analysis of MIS on strategic decision making. *International Journal of Advanced Research in Engineering and Technology*, 12(4), 85–91.
- Power, D. J. (2002). *Decision support systems: Concepts and resources for managers*. Quorum Books.
- Syalevi, R., Raharjo, T., & Wibowo, W. S. (2024). The impact of project management offices on organizational performance: A comprehensive review of the literature. *International Journal of Information Systems and Project Management*, 12(3), 72–94.
- Viriando, H., & Sfenrianto. (2021). Using DeLone and McLean information systems success model to measure enterprise resource planning success: A literature review. *Journal of System and Management Sciences*, 11(2), 182–198.
- Wand, Y., & Wang, R. Y. (1996). Data quality dimensions. *Communications of the ACM*, 39(11), 86–95.
- Wang, R. Y., & Strong, D. M. (1996). Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems*, 12(4), 5–33.
- Wixom, B. H., & Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research*, 16(1), 85–102.

- Abugabah, A., Sanzogni, L., & Alfarraj, O. (2010). The impact of information systems on end-users' performance: A literature review. *Journal of Information Systems Research*, 21(2), 1–15.
- AlDarmaki, H., Bhaumik, A., & AlRajawy, I. (2019). Influence of project management on organizational efficiency and effectiveness: An empirical study on UAE private sector. *International Journal on Emerging Technologies*, 10(1a), 147–151.

---

**Compliance with ethical standards***Disclosure of conflict of interest*

The authors declare that they have no conflict of interest.

---

**Disclaimer/Publisher's Note:** The statements, opinions, and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of ALBAHIT and/or the editor(s). ALBAHIT and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions, or products referred to in the content